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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/918,399	07/30/2001	Peter Trefonas III	50792	4635

21874 7590 12/27/2004

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EXAMINER

BARRECA, NICOLE M

ART UNIT PAPER NUMBER

1756

DATE MAILED: 12/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/918,399

Applicant(s)

TREFONAS ET AL.

Examiner

Nicole M Barreca

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 and 45-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 and 45-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-38 and 45-48 are pending in this application.

Response to Amendment

2. The 35 U.S.C. 102 rejection over JP 10-301268 has been withdrawn in response to the applicant's amendment, which added a resin to the antireflective composition.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 45-48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 45-48 recite that the antireflective composition comprises separate components of a resin, crosslinker, a basic additive and an acid or a generator compound or a thermal acid generator compound. Since these claims depend on claims 1 or 18, it is unclear if there is intended to be more than one resin, crosslinker and/or basic material, or if the applicant is only further limiting the claim by requiring them to be separate components (and adding an acid or generator). Is the "basic additive" of claims 45-48 the same component as the "basic material" of claims 1 and 18? It is also unclear what a generator compound means. What is it generating?

6. For examination purposes the examiner has interpreted claims 45-48 to require only one resin, crosslinker and basic material (but that they are separate components) and that the generator compound is an acid generator.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 5-8, 10-12, 14-16, 18-20, 24-27, 29, 30, 32-34, 36-37, 45-48 are rejected under 35 U.S.C. 102(a) as being anticipated by Sinta (EP 987 600).

9. Sinta discloses an antireflective coating composition comprising a crosslinker for use with an overcoated resist layer at sub-200 nm exposure radiation. The resin binders of the ARC composition have phenyl units of Formula I-III [0017]-[0025]. The crosslinking antireflective compositions preferably include an acid or acid generator for promoting the crosslinking reaction of the glycouril compound during the curing of the ARC coating layer. Preferably the acid generator is a thermal acid generator. Instead of or in addition to the thermal acid generator, a photoacid generator may be employed as the acid generator [0032]-[0039]. Example 11 teaches an antireflective composition also including a basic component. The ARC composition comprises the polymer of Example 1 (terpolymer of styrene, 2-hydroxyethylmethacrylate and methylmethacrylate [0064] or applicant's resin), tetramethoxymethyl glycoluril (crosslinker), hexamethoxymelamine mixture (basic material containing one or more amine groups), and di(4-tert-butylphenyl)iodonium perfluorooctane sulphonate (photoacid generator) [0076]. Preferably the ARC's are used with a positive chemically amplified resist

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composition [0044]-[0047] and may be exposed at 193 nm, followed by development [0095]. Preferably the antireflective layer is cured prior to the formation of the overcoated photoresist layer [0058].

10. Claims 1, 5, 8, 10, 11, 14, 16, 18-20, 24, 27, 29, 32-34, 37 are rejected under 35 U.S.C. 102(b) as being anticipated by Sinta (US Patent 5,886,102).

11. Sinta discloses antireflective coating compositions comprising a resin binder and a crosslinker, with low basicity crosslinkers, such as methoxy methylated glycouril (containing N and O atoms) being particularly preferred. The resin binder for the ARC includes aromatic groups, such as chromophores (col.4, 45-67). The antireflective composition preferably further includes an acid or acid generator in order to promote the crosslinking reaction of the glycouril compound during the curing of the antireflective coating. Preferably the acid generator is a thermal acid generator. See col. 7, l. 31-col.8, l. 50. The antireflective coating is applied to a substrate and thermally cured, with the acid generator promoting the crosslinking. A photoresist is then applied over the antireflective surface, imaged through a mask (KrF, see ex.7) and developed. Preferred photoresist compositions include positive photoacid generating resists (chemically amplified). See col.9, 3-19; col.12, 1-65.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 1, 5-11, 13-16, 18, 24-29, 31-34, 36, 37, 45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshiro (JP 10-301268, based on Derwent Abstract and the English translation from JPO) in view of Kang (US 6,465,148).

14. Toshiro discloses antireflection film material which contains a crosslinking agent, solvent and one or both of an acid compound and a basic compound. The antireflection film is used for forming a photoresist pattern by exposing at 193 nm or 248 nm a positive chemical amplification resist through a mask, prebaking and then developing. See the Derwent abstract, [0002]-[0003] of English translation. The addition of the acid and/or the basic compound is controlled according to the amount of acid produced from the acid generator of the chemically amplified resist. By controlling the acidity at the interface between the resist film and the antireflective film, contraction and trailing of the resist pattern can be avoided and pattern resolution can be improved. An example of an acid is benzenesulfonic acid. An example of the base is N methyl pyrrolidone. See also the abstract, [0015], [0026] and [0027] of the English translation. While Toshiro does not explicitly disclose the use of a polymeric basic material, or a basic material which contains one or more hydroxyl, ether or sulfide groups as the basic additive, the reference does teach that the basic material is controlled according to the acidity of the acid produced from the photoacid generator. It would have been within the ordinary skill of one in the art to determine the acidity of the photoacid generator and the corresponding basic material required to control it, and to have the basic material be polymeric or to contain one or more hydroxyl, ether or sulfide groups, if required, based on these teachings of Toshiro. Toshiro does not disclose the antireflective composition

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to include a resin. Kang teaches that the addition of a resin to an antireflective composition will improve the film-forming properties of the composition. Suitable examples include novolak resin, hydroxystyrene-containing polymer, polyimide and the like (col.6, 29-54). It would have been obvious to one of ordinary skill in the art to include a resin, such as novolak resin, hydroxystyrene-containing polymer, or polyimide, in the antireflective composition of Toshiro because Kang teaches that the addition of a resin to an antireflective composition will improve the film-forming properties of the composition.

15. Claims 1, 5-11, 13-16, 18-20, 24-29, 31-37, 45-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Padmanaban (US 6,329,117) in view of Toshiro (JP 10-301268).

16. Padmanaban discloses an antireflective coating composition comprising a polymer represented by the General Formula I-IV (resin), a crosslinking agent and a thermal acid generator (col.4, 42-col.6, 33). R2 represents a phenyl group and D may represents phenyl, naphthalene, anthracence (col.7, 1-67). See also the polymer synthesis examples 1-10. The bottom antireflective composition was coated on a wafer and baked (crosslinked and cured), followed by the deposition of a chemically amplified positive or negative photoresist or a positive or negative i-line novolak resist. The resist was exposed at 193 nm or 248 nm and developed (col.11, 55-col.12, 18). Padmanaban does not disclose that antireflective layer includes a basic material. Toshiro teaches that the addition of a basic compound to an antireflective composition will prevent the contraction or trailing of a resist pattern by controlling the acidity of the acid produced

from the photoacid generator of the photoresist, thereby resulting in higher resolution (abstract). An example of such a basic material includes n-methyl pyrrolidone [0026]. It would have been obvious to one of ordinary skill in the art to add a basic material to the antireflective composition of Padmanaban because Toshiro teaches that the addition of a basic material to an antireflective coating will prevent the contraction or trailing of a resist pattern and result in higher resolution. While Toshiro does not explicitly disclose the use of a polymeric basic material, or a basic material which contains one or more hydroxyl, ether or sulfide groups as the basic additive, the reference does teach that the basic material is controlled according to the acidity of the acid produced from the photoacid generator. It would have been within the ordinary skill of one in the art to determine the acidity of the photoacid generator and the corresponding basic material required to control it, and to have the basic material be polymeric or to contain one or more hydroxyl, ether or sulfide groups, if required, based on these teachings of Toshiro.

17. Claims 2-4 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshiro in view of Kang or Padmanaban in view of Toshiro as applied to claims 1 or 18 above, and further in view of Hatakeyama (US Patent 5,985,512).

18. Toshiro teaches an antireflective composition comprising a crosslinker, wherein the basic compound is added in order to control the acidity caused by the photoacid generator at the interface between the resist film and the antireflective film. While Toshiro only gives a single example of a basic compound and does not disclose using a basic material having a pKa of about 3 or greater, a pKa of about 6 or greater or a pKa of about 9 or greater, the reference does teach that the basic compound is not limited to

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the example given in formula 3 and that the kind and amount of the basic compound will depend on the acidity of the kind of resist used. See [0028]-[0031] of English translation. Hatakeyama teaches examples of strong nitrogenous basic compounds having pKa's of at least 7, preferably 7.5 to 13, which will capture acid generated by radiation (col.3, 1-6, col.4, 30-67). It would have been obvious to one of ordinary skill in the art to add a strong basic compound having a pKa preferably between 7.5 and 13 to the antireflective composition in the method of Toshiro in view of Kang or Padmanaban in view of Toshiro in order to control the acidity of the resist/antireflective interface, if the kind of resist being used required, because Toshiro teaches that the choice of the basic compound is dependent on the kind of resist being used and Hatakeyama teaches that basic compounds having pKa's preferably between 7.5 and 13 are known to capture acid generated by radiation.

19. Claims 17 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sinta (EP), Sinta (US), Toshiro in view of Kang or Padmanaban in view of Toshiro as applied to claims 16 or 18 above, and further in view of Park (US 5,882,835).

20. The references do not disclose that the photoresist layer contains acetal groups. Park teaches that a positive photoresist resin containing acetal groups as protecting groups has advantages over conventional resist because it can be easily deprotected by a weak acid and low temperature PEB (col.7, 28-35). It would have been obvious to one of ordinary skill in the art to use a photoresist having acetal groups in the methods of Sinta, Toshiro in view of Kang or Padmanaban in view of Toshiro because Park

teaches that such as resist has advantages over conventional resist because it can be easily deprotected by a weak acid and low temperature PEB.

Response to Arguments

21. Applicant's arguments with respect to JP 10-301268 has been considered but are moot in view of the new ground(s) of rejection.

22. Applicant's arguments with respect to Sinta (US 5886102) and Hatakeyama have been fully considered but they are not persuasive.

23. The applicant argues that Sinta (US 5,886,102) does not disclose an antireflective composition comprising a basic material, a crosslinker and a resin. However Sinta does disclose an antireflective composition comprising a crosslinker, which is taught to be basic, and a resin, meeting the limitations as recited by claims 1 and 18. Only dependent claims 45-48 require that the basic material and the crosslinker be separate components.

24. With respect to Hatakeyama, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

25. In response to applicant's argument that there is no incentive to combine Hatakeyama because the reference is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned,

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in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Hatakeyama is reasonably pertinent to the particular problem with which the applicant was concerned. While Hatakeyama teaches a photoresist and not an antireflective composition, both this reference and Toshiro, in addition to the applicant, are concerned with the particular problem of capturing the acid generated by radiation. Toshiro teaches that a basic material is added to the antireflective composition in order to control the acid generated by the photoacid generator during exposure. Hatakeyama teaches that a strong basic compound having pKa's between 7.5 and 13 will capture acid generated by radiation, thereby providing the motivation to combine.

Conclusion

26. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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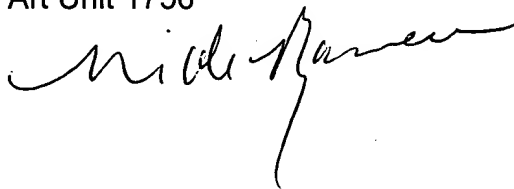
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M Barreca whose telephone number is 571-272-1379. The examiner can normally be reached on Monday-Thursday (9AM-7PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nicole M Barreca
Examiner
Art Unit 1756



12/20/04